A Literature Based Study On Information & Communication Technology (ICT) As An Effective Tool In Materials Management

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Abstract : **In today's competitive world, "survival of the fittest" holds good ; one has to manage the future in order to survive and sustain in this edge of technological era. Managing the future mean managing information . In order to deliver quality information to decision maker at the right time and as well to automate the process of data collection, collation, speedy and refinement organization have to make Information Technology as ally, harness its full protentional and use it in the best possible way . II is beneficial for cooperation and integration within the stakeholder of the supply chain. This study seeks to identify the implementation of information technology tools for materials management functionality. The main barrier is found to be cost involvement at the initial stage or overall implementation of the process. The main objective is to streamline process, procedure, system, efficiency, accountability, transparency, transactions for the overall growth of an organization .**

Key words: **Competitive; IT; Materials Management; Implementation; Coordination; Cooperation; Function; Streamline; SCM; Organization ;**

INTRODUCTION

Materials Management is a core supply chain function and includes supply chain planning and supply chain execution capabilities. Specifically, materials management is the capability firms/organization use to plan total materials requirements. The materials requirements are communicated to the procurement and other functions for sourcing. Materials management is also responsible for determining the amount of materials to be deployed at each location across the supply chain, establishing materials replenishment plans, determining inventory level to hold each type of inventory (raw materials, WIP, finished goods) and communication information regarding materials needs throughout the extended supply chain . The primary business objective of materials management is assured supply of material, optimum inventory levels and minimum deviation between planned and actual results.

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) is an extensional term for information technology that stress the role of unified communications and the integration of telecommunications (telephone lines and wireless signals) and computers, as well as necessary enterprise software, middleware, storage and audiovisual systems that enable users to access, store, transmit, and manipulate information. The term ICT is also used to refer to the convergence of audiovisual and telephone network with computer networks through a single cabling or link system . There is large economic incentive to merge the telephone network with the computer network system using a single unified system of cabling, signal distribution and management . ICT is an umbrella term that includes any communication device, encompassing radio, television, cell phone, computer and network hardware, satellite system and so on, as well as the various services and appliances with them such as video conferencing and distance learning . ICT is a broad subject and the concept are evolving . It covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital for (e.g. personal computers, digital television, emails or robots).

In order to understand materials management, the following process are discussed : planning, procurement, logistics, handling, stock and waste control.

Planning : Materials planning includes quantifying, ordering and scheduling. It is stressed that planning is especially significant in terms of increasing productivity, profit and facilitating the timely completion of projects. Hence, productivity will suffer if the materials planning is not executed properly **.**

Procurement : Procurement is described as the purchase of materials and services from outside organization to support the firm's operation from production to marketing, sales and logistics .

Logistics: Generally, logistic is a concept that emphasizes movement and it may include planning, implementing and controlling the flow and storage of all goods from raw materials to the finished product to meet customer requirement .

Handling: Handling of materials is the flow component that provides for their movement and placement . Due to the frequency of handling materials there are quality consideration when designing a materials handling system.

Stock & waste control: Stock control is classified as a technique devised to cover and ensure all items area available when required . Stock control can include raw materials, processed materials, assembly components, consumable stores, general stores, maintenance materials and spares, work in progress and finished products. It is of great importance that the bulk of materials delivery requires proper management of stock control.

INFORMATION & COMMUNICATION TECHNOLOGY TOOLS VARIOUS ROLES:

Information & Communication Technology is revolutionizing the way, in which we live and work. It is changing all aspects of our lifestyle. The digital revolution has given mankind the ability to treat information with mathematical precision, to transmit it with high accuracy and to manipulate it. These capabilities are bringing into being, a whole world within and around the world. The calculation power that is available to mankind is increasing at an exceptional rate and computer and communication is becoming integral parts. At the organizational level, ICT should assist in specifying the objective and strategies of the firms/organization. ICT should also aid in developing and supporting and procedures to achieve them. At the department level, IT must ensure a smooth flow of information across departments, and should guide organization to adopt the most viable business practices. At this level, ICT ensures seamless flow of information across the different departments and develops and maintains an enterprise -wide database. This database will eliminate the need of the isolated data islands that existed and in each department and make the organization's data accessible across the departmental boundaries . This enterprise wide sharing has many benefits likes automation of procedures, availability of high-quality information for better decision-making and faster response times.

Government e-Marketplace portal (GeM portal):

Government of India has introduced procurement of commons use of goods & services through launching of this portal since June,2016. GeM is one stop Govt. e-Market place is dynamic, self sustaining and user friendly portal for making procurement by the government users. GeM eliminates human interface in vendor registration, order placement and payment processing, to a great extent. Being an open platform, GeM offers no entry barriers to bonafide suppliers who wish to do business with the Government .

Enterprise Resource Planning (ERP) : This is a method of using computer technology to link various functions – such as accounting, inventory control, and human resources across an entire organization. ERP is intended to facilitate information sharing, business planning and decision making on an enterprise-wide basis.

Materials Resource Planning (MRP) : The basic function of an MRP systems in materials management includes inventory control, bill of materials processing, and elementary scheduling. MRP helps organization to maintain low inventory level. It is used to plan manufacturing, purchasing, and delivering activities .

RFID TECHNOLOGY, MOBILE DEVICES-PDA, BAR CODING AND WEB PORTALS :

These tools can help in improving the effectiveness and convenience of information flow in construction supply chain control systems.

ICT & SUPPLY CHAIN :

The supply chain management (SCM) is concerned with the flow of products and information between the supply chain members that encompasses all of those organizations such as suppliers, producers, service providers and customers. These organization linked together to acquire, purchase, convert/manufacture, assemble and distribute goods and services from suppliers to the ultimate and users. Today, information and communication technology must be conceived of broadly to encompass the information that businesses create and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information with the emergence of the personal computer, optical fiber networks, the explosion of the Internet and the World Wide Web. The cost and availability of information resources allow easy linkage and eliminate information related time delays in any supply chain network. This means that organization are moving towards a concept known as Electronic Commerce , where transaction are completed via a variety of electronic media, including electronic data interchange (EDI), electronic fund transfer (EFT), bar code, fax, automated voice mail, CD-ROM, catalogs, and a variety of others. The old "paper" type transactions are becoming increasingly obsolete. Leading-edge organizations no longer require purchase requisitions, purchase orders, invoices, receiving forms, and manual account payable matching process. All required information is recorded electronically, and associated transaction are performed with the minimum amount of human intervention. Recent development in database structure allowed part numbers to be accumulated, coded and stored in database, and technically ordered. With the application of the appropriate information systems, the need to constantly monitor inventory levels, place order and expedite orders will soon become a thing of the past.

ROLE & IMPORTANCE OF INFORMATION IN MATERIALS MANAGEMENT :

Information is one the most important key to the decision making in business process of any organizations. Prior to the 1980, a significant portion of the information used to flow between functional areas within an organization and between supply chain members organizations, were paper based. In many cases, these paper-based transaction and communication were slow, unreliable and error prone . Conducting business in this manner was costly because it decreased from firm's effectiveness in being able to design, develop, procure, manufacture and distribute their products. During this period, information was often overlooked as a critical competitive resource because its value to supply chain members was not clearly understood. However, firms that are embarking upon supply chain management initiatives now recognize the vital importance of information and the technologies that make this information available . Really, information system and the technologies tools utilized has fundamentally evolved a link amongst the organization to work smoothly and faster. This has resulted cycle time reduction, implementing redesigned cross functional process, utilizing cross selling opportunities, capturing the channel to the customers in the supply chain management. Timely and accurate information is more important and critical now at any time. The below mentioned factors have strongly impacted this change in the importance of information :- I: Satisfaction of customers and users II. Information is very crucial in managers' abilities to reduce inventory and human resources requirement to a competitive level. III. Information flow play an essential role in strategic planning for and deployment of resources.

IMPORTANCE OF INTER ORGANIZATIONAL INFORMATION SYSTEM :

Generally, in supply chain management, the suppliers, producers, customers are the members and are linked through the ultimate level of integration. These members are continuously supplied with information in real time. The foundation of the ability to share information is the effective use of Information Technology within supply chain . Appropriate application of these technologies can only provide decision makers with timely access to all required information from any location within the supply chain. Recognizing the critical importance of information in an integrated supply chain environment, many organizations are implementing some form of an inter-organizational system (IOS). An IOIS is an integrated data processing/data communication system utilized by tow or more separate organizations. The development of an IOIS for the supply chain has three distinct advantage; cost reductions, productivity improvement and product/market strategy . The main five basic level of participations for individual organization/firms within inter organizational systems are :

(a) Remote I/O node, in which the member participates from a remote location within the application system supported by one or more higher level participants

(b) Application processing node, where members develops and share a single application such as an inventory -query or order processing systems.

(c) Multi participating exchange mode in which member develops and share a network inter-linked itself and any number of lower-level participants with whom it has an established business relationship .

(d) Network control node, in which the member develops and shares a network with diverse application that may be used may different types of lower-level participants and finally

(e) Integrating network mode, in which members literally becomes a data-communication/data processing utility that integrates any numbers of lower level participants and application in real time.

Information is of crucial importance in SCM cooperation because it is present in all three aspects like cooperation, collaboration and integration of SCM the core SCM model. Some even see information as n independent production factors of materials, capital and human capital . In general, a distinction can be drawn between the volume of information and the richness of information exchanged. In the case of coordination, the amount of information exchanged is generally larger, whereas the information exchanged in collaborative relationship is richer. **Evans and Wurster** have differentiated between the richness of information. Reach refers to the number of people or companies exchanging information and therefore to connectivity. Richness is characterized by the dimensions bandwidth, customization and interactivity. Data must be turned into information by being organized, modeled, formatted, edited, verified, placed in context and delivered in a timely manner to decision makers before it takes on value. Integrated and coordinated decision in supply chain network require a free flow of relevant information . Acknowledging the importance of information of SCM raises the question of how important it is . Many researchers have tried to capture the value of information by different methods. Typically, the following types of information are of relevance (Lee & Whang):-

i. **Inventory level** – This includes all kinds of inventory such as materials, work in progress, finished goods in transit.

ii. **Sales Data:** Ultimate sales data lessen the negative effect of distorted demand information when simulated with visible end customer demand.

iii. **Sales forecast** : Since companies adapt their plans to their forecast, it is more important to share thee expectations. If sales data are shared, every company in the supply chain could do their forecasts based on ultimate sales data.

iv. **Order status tracing and tracking :** This support mainly customer service and reduce uncertainty in the supply chain and for the ultimate customer**.**

v. **Production and delivery schedule :**The different tiers in a supply chain can align their operations to support the whole process if production and delivery schedules are shared, as is the case for just—in-time relationship.

vi. **Capacity :** Sharing capacity information, especially production and transportation capacities, can mitigate shortage and gaming behavior and supports supply chain planning .

vii. **Performance metrics:** This includes all performance metrics that are relevant for the whole process under consideration. Examples are quality data, lead times, queuing delays, and service performance, to names a few.

CONCLUSION

Based on the purpose of this study in order to investigate the use of ICT in materials management, the main tools, information sharing that are widely adopted by the users, firms, organizations and companies have utmost importance for effective functioning of materials management system and SCM. Subsequently, planning and procurement are the materials management processes considered needing the highest investment of ICT implementation . Evidently, some tools like bar-coding and RFID are hardly adopted in the materials management of each respondent's company. Nevertheless, ICT transformation was deemed vital especially in the area of cost effectiveness and in materials handling. On the other hand, the main reasons for resistance towards the increased level of implementing ICT in materials management are due to high cost involvement whether in the maintenance or overall implementation . In addition, the exceptional high cost of special software is also barrier to the upgrading of ICT usages in materials management . With the advancement pace of technology innovation, idea, creation, entrepreneurial/startup entity the role of ICT and quality of information are complementary to each other because manual filtering might disappear. Although, automated information processing prevents manual mistakes, it also makes the process less transparent, wrong information or information of low value might be generated if the information input is already of bad quality and not properly checked . A distinction can be generated between the volume of information and richness of information exchange . The sharing of information in systematic language involves more actions and commitments support to enhance the quality of any organization which is beneficial in the light of supply chain networks as well as for the whole materials management systems .

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